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ABSTRACT

The different uses to which two adult educators put their personal computers illustrate some of the many personal and professional applications of microcomputers and point to some implications for home computers in the field of adult education. Relying primarily upon prepared software packages, the first educator relies on his computer as a resource to aid in word processing and in home and professional management. The second educator, on the other hand, is primarily a hobbyist who finds his computer a constant source of intellectual stimulation. Both users of personal computers represent a significant potential market for credit and non-credit adult education offerings. Both educators have found their home computers a valuable professional resource in that it eliminates the need for copious notes, outlines, and drafts when preparing professional reports; reduces typing and dictation time; provides constant intellectual stimulation; forces individuals to better organize their thoughts; and facilitates the rapid retrieval of information. The growing use of home computers has created the need for new software packages that are based on a humanist rather than a behavioralist philosophy as well as for additional adult-level courses or workshops on using home computers. The personal computer is also a valuable tool for use in adult education program administration. (MN)

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PERSONAL COMPUTER LITERACY: PERSONAL AND PROFESSIONAL APPLICATIONS

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Introduction

The development of personal computing promises to have as great an impact on our society as the development of the printing press on late medieval society. Why is the computer revolution here to stay? For one reason, personal computers are becoming more powerful all the time. Each new generation (perhaps every five years) results in a product with more memory, more capability, more user ease, and more miniaturization. This increasing portability equates the personal computer in many ways to the product of the printing press. The increasing power of personal computers also suggests that breakthroughs in terms of interactive capability and software are just around the corner.

Another important reason is the fact that through mass production, increased technology, and fierce competition, the price of a personal computer continues to decline. Like the telephone or even the television set, a personal computer is now financially possible for millions with the continued promise of even lower prices.

Thus, by the end of this decade, computer literacy promises to be a basic literacy. For many of us over thirty-five this is a rather disconcerting prospect. We have been raised in a formative period designed to create computer trauma. We have been taught that computers are the province of a brilliant computer priesthood; we have seen television programs and movies warning us that computers are dangerous to our privacy or, in the case of the "Forbin Project," even to our world. Many older adults are simply frightened of computers. This is tempered by a fascination with computers that also exists among people of all ages. Such a situation suggests that programming for computer literacy represents a significant future need for adult education.

Therefore, the real challenge for adult educators today may be to not let this revolution become just another fad that passes through the historical annals of education. In other words, we must learn how we can make the best use of computers

rather than how can they help us. Reaching the vast market of adult learners takes on a different meaning when such a goal is kept in mind. The purpose of this presentation is to describe how the micro-computer can be used both personally and professionally. In addition, some implications for the field of adult education will be described and some potential uses demonstrated.

Personal Uses

As two adult educators who have made investments in home computers, we would like to share some observations on how this has affected our personal and professional lives and offer some suggestions for integrating personal computers into adult education. We both own Apple II's but we represent two distinctly different types of adult users. Roger is a relatively new Apple owner who primarily uses prepared software packages for word processing, home and professional management, and education. Hugh purchased his Apple a number of years ago and is primarily a hobbyist. While he uses his computer professionally, he primarily finds his computer to be a constant source of intellectual stimulation. Both types of personal computer owners represent a significant potential market for credit and noncredit offerings.

The typical purchaser of a home computer has a variety of tasks planned for its use. It will aid in tracking household expenses, act as a tutor for children, be a source of entertainment, be used for word processing, and keep track of things. However when the new purchaser sits down to use a personal computer, he or she finds that an extensive learning process must take place prior to doing anything useful with the machine. With a few notable exceptions, there is very little local dealer support in understanding the basic tasks of using a new computer. For example, the first task can be something as simple as finding the power switch. On most home computers or business terminals, the switch is hidden in the back. Many new Apple owners try to turn on the machine with the power on light at the bottom of the keyboard. The point is that it takes about an hour of instruction to effectively use commercial turnkey software.

Perhaps it would help to describe one person's use of an Apple II. As a hobbyist, I (Hugh) am using it to become familiar with a variety of computer languages: BASIC, LOGJ, PILOT, and Pascal. In addition, I have been developing an understanding of how the Disk Operating System works. This last project has required learning hexadecimal arithematic and acquiring some familiarity with principles of machine level programming. In order to understand these various pursuits, I belong to two national Apple clubs (called by the unique names of A.P.P.L.E. and Apple for the Teacher) as well as serving as an officer in a local club. I subscribe to five magazines

(Creative Computing, Nibble, Call-A.P.P.L.E., Hardcore, and Softalk) and read one or two others on a regular basis.

On the other side of the picture, I (Roger) use the personal computer primarily with a variety of software. I have a word processing package that I use a great deal for drafting professional correspondence, writing reports, corresponding with relatives, and storing a variety of files that periodically can be updated or reused. I also use PFS, a filing and sorting package, for keeping track of volunteer interests of adult members of the church I belong to, for our menu file, and for our Christmas card list. I also have a statistics package, a calculations package, a personal finance package, several games and educational tutorial packages, and a typing tutorial diskette from which my children have learned how to type (one of our family prerequisites to using the personal computer). Incidently, my oldest daughter is in the middle school computer club and appears as though she will become a user somewhat similar to Hugh. I only subscribe to one computer magazine and read it or occasional books primarily to seek out software programs that I can in a "cookbook" fashion use to create my own software.

Thus, the major home applications of a personal computer given the wide variety of user types are entertainment, record keeping and analysis, financial management applications, word processing, educational applications, and programming. In addition, a personal computer can be used with other hardware to control electrical circuits and access other computers. Each of these latter applications require a significant level of expertise.

There are two major areas of entertainment: "arcade games" and "adventure" games. Typical arcade games are "Invaders", "Apple Panic", and "Raster Blaster" (a pinball simulation). A related area has been the development of computer based board games such as "Monty Plays Monopoly" and various chess, Othello, and backgammon simulations. The "adventure" game which is a genre roughly based on "Dungeons and Dragons" probably represents the most complex application of home computers to entertainment. In this genre the participant becomes the main character in an interactive work of fiction. The object in most adventures is to face danger, accumulate treasure, bargain with merchants and thieves, and finally reach the end of the quest.

Typical applications in the home of record keeping and analysis are: tracking expenses by category, filling out income tax forms with computer generated supporting documents, analysing personal food intake, maintaining a personal calendar, addresses, phone numbers, and an inventory of personal goods. There also are data bases available for menus, bar recipes, literature on the Apple, grocery lists,

and stocking wine cellars. The purchaser of a home computer is faced with the problem of whether to purchase a general purpose data base managment system such as dBase, DBMaster, or Visifile or dedicated programs for a major application such as the Diet Master, a program which tracks individual meals and keeps track of calories, carbohydrates, vitamins and minerals, and compares actual diet with an ideal diet for that person.

Financial management also can represent a significant use for the home computer. After using the home computer to track my checks for one year, I personally found it easier to balance the checkbook with a hand calculator and only enter deductable items in the computer for end of the year purposes. However, the home computer is invaluable in calculating interest rate tables and filling out the multitude of forms required by I.R.S. For the home investor there are numerous programs and data bases for analysing investments with virtually every model of technical analysis available to professional stock brokers. A significant number of investment analysis programs are in the public domain.

Educational applications are an area of significant frustration to many purchasers of home computers. Good instructional programs are both rare and often expensive. Furthermore, there is very little correlation between price and value. Perhaps the best educational programs available for home use are the "adventure games" which stress imagination, problem solving, and fantasy. Most educational programs available for the home are "drill and practice" or "quizzes". (We will spend some additional time later in this presentation describing some of the philosophical and instructional issues of importance for adult educators.) Some programs that are worthy of notice are typing tutorials (such as the one Roger uses with his children) that give instant feedback on rate and mistakes, Minnesota Educational Computing Consortium disks (which includes some rather interesting simulations), and the Milliken Publishing Company's medical continuing education series for physicians. The Milliken series tracks progress through the lessons and provides continuing education credits from Washington University Medical School when the lesson disk is returned and verified.

Word processing is a growing area of interest in the home as well as the office. This paper has been prepared using a word processing program developed for home use. It is self documenting with built in tables of available commands. There are literally scores of word processing programs and utilities available for home computers. It is an area which requires some expertise in choosing a program and using the program. Prices of available programs range from fifty to hundreds of dollars. The purchaser must be aware of the features that will be needed, the complexity of the program, whether special additional hardware will be needed (such as eighty column

boards for the Apple or Atari), and compatibility with available printer(s). Accessory diskettes which can be interfaced with word processing packages include dictionary programs which check spelling, grammar programs which search for common errors and cliches and make suggestions for change, and form letter and mailing programs.

Programming applications consist primarily of learning new languages and developing special purpose programs. Alvin Toffler, in The Third Wave, speaks of the development of "electronic cottage industries." This is already happening in the area of personal computer software. A significant number of personal computer hobbiests are writting software for commercial application or for special needs of their own. At the moment there are a multitude of languages available for the Apple alone. Just to name a few would include: COBOL, FORTRAN, FORTH, LISP, PILOT, LOGO, Pascal, numerous assemblers and at least ten dialects of BASIC. In addition, there are various special purpose authoring languages for writing data bases (SAVVY), programs (The Last One) and computer assisted instruction (GENESIS or the Zenith Educational System).

As programming becomes a common skill, it will have an increasing impact upon our society. The process of developing programs affects the logical structures of the programmer and each language reflects a different approach to problem solving. Assemblers require a meticulous eye for detail; Pascal requires advance planning and charting before writing code. FORTH and LOGO allow you to create the language you need as you develop your programs. BASIC encourages starting with an idea and improving it as you work with the program. Some developing languages, such as Smalltalk, will be based on systems of divergent thinking. One of the basic issues raised by Seymour Papert (Mindstorms) for this developing age of computer literacy will be "does the user program the computer or does the computer program the user?" While Papert raises the question in relation to computer literacy for children, the question also can be applied to adult education efforts in computer literacy.

The area of home computer use promises to be a significant area for the development of adult education offerings from a variety of vendors. A thorough understanding of the motivations, uses, and limitations of the home user will be a necessary ingredient in developing sound programs. At the moment, the best educational efforts for such a consumer are being conducted by user organizations and through a variety of books and magazines. These efforts are meeting only a portion of the needs for guidance and understanding of the home user. A particular need of many new purchasers is instruction in the use of software packages which require familiarity with a variety of commands incorporated in the package. In a later portion of our presentation we will describe in greater detail

various continuing education implications.

Professional Uses

There also are a multitude of professional uses of potential value to adult educators. For example, I (Roger) have completely changed my writing style and procedure since obtaining proficiency with my word processing package. I no longer use an extensive outline when writing a book chapter, journal article, or conference paper. A few notes or thoughts jotted on a sheet of paper that I can lay next to the keyboard now seems to suffice. It is as though the ease now possible in flipping back and forth among "pages" or "files" has eliminated the need for that extensive outline.

I also have been able to eliminate one or more drafts of a paper. My "green" colored screen that reduces eye fatigue and the ease with which a file can be saved now permits me to edit and review right from the TV monitor. My word processing package also allows printing to take place before storage or directly from the "editor" mode so that if I want a "rough" draft to take to a meeting, for example, it can be easily obtained if I don't happen to be particular about margins or fancy formats. Corrections, changes, additions, indexes, and footnoting also is relatively easy so that time for me, for typists, and for others as proof-readers is conserved.

As a matter of fact, I have found that the total typing time required to complete a work week has been greatly reduced. On a number of occasions, I have been able to type a report and format it on my computer in a way that suits my needs and then simply print a final copy. An extension of this is how I used the word processing package to help me prepare for this conference. One of my responsibilities was to prepare the Commission of Professors' pre-conference printed program. In my role as Chair this year, I was left with the task of pulling all the various pieces together. Thus, ultimately I was the only one to know of all the final times, room numbers, paper titles, etc. By putting a first draft on file, printing it out, and then burning stencil masters, I was able to have multiple copies run off not only to mail to the CPAE membership as an advance conference program and advertisement, but also something that could be sent to all program presenters and board members for proofing and corrections. Then two days before I got on the plane for San Antonio, I did a final update, printed it out, burned stencil masters, and ran off the copies needed for attendees.

I also use the word processing package as a type of dictaphone. I have never liked the process of oral dictation to either another person or into a dictaphone. It usually necessitates a rough draft being typed and sometimes a delay in turn-around time. Now, because I am a fairly fast typist,

I can rough out drafts of several letters that need formal typing on a letter head while not worrying much about margins, punctuation, etc. Then the Departmental secretary who knows both my quirks and the field of adult education quite well, can type a final copy for my signature. Frequently this has saved one or more days of turn-around time and I know it has saved actual work time for me and the Departmental secretary.

A more difficult to describe professional use is what has happened to my thinking processes. I do know that I have become more orderly and organized in my thinking. Perhaps that is because I have had to plan ahead more in using some of my software packages. I also have a renewed appreciation for the clarity and structure required to create certain types of products or reports. Rather than making me sloppier as one might think could happen, the speed, convenience, and power of the computer has helped me to develop more order and structure.

Although I have no real empirical proof to offer and can't say if some of the literature supports this contention, I believe that my memory capacity has been sharpened and enhanced. Again, it is difficult to explain this with precision, and there is a relationship to my no longer needing an extensive outline; however, I somehow am able to remember with more clarity what I have typed long after I have typed it. Perhaps an explanation lies in the fact that when I before was "creating" with my typewriter or my pencil, I somewhat lazily rested on the ability to quickly turn back to previous pages. Now that such a visual crutch is not lying before me, I seem to not need to do that. Again, the orderly thought required to use some of the packages or to do some very basic programming also no doubt has a correlation.

As Hugh noted when he decribed his hobbiest induced stimulation, I, too, find an intellectual stimulation from figuring out forms and formats, from creating a new "file," and from obtaining some mastery over a new piece of software. I also feel that a professional has to obtain a heightened sense of technology, change, and the future when mastering the computer and attempting to keep up with all the new aspects of being computer literate. Such a sense of being in touch with the future should rub off on other aspects of ones professional life.

Another important professional derivative of computer proficiency is the ability to quickly retrieve lots of information. I don't have a phone modem yet, but one of my colleagues does. He regularly ties into the university's mainframe for a variety of uses. In addition, he recently learned how to tie into the Development Office's funding search program and to the University's computerized bibligraphic search program established for the library. Some

people may have difficulty with such abilities because of 1984 or "Forbin Project" associations. However, the ability of a professional to work from his or her home or to carry out searches directly from the office does speak to issues of efficiency and productivity.

Information retrieval and efficiency also are tied to such ativities as proposal development. Although I have not yet stored "template" information on the resources of the university, of the community, etc., I soon hope to do this so that when I'm developing a proposal for outside funding I can simply "retrieve" certain pieces of standard information in any order that I want. Such an ability also can be used with course syllabi, resumes, budget information, etc.

I also use the computer for a wide variety of student-related activities. For example, we update our student roster and mailing lists every few months via my computer. We also keep track of advisors and their advisees, graduations, alumni addresses, and past course information, all of which comes in very handy at annual report time and for future accreditation reviews. We also are now working on a system for keeping track of student progress through their graduate programs. All of these activities will be even more valuable when the Department obtains its own micro-computer capabilities.

A final professional use to be shared here has to do with a recent activity I undertook as Chair of the Professors of Adult Education group. It underscores so well the capability of the computer in helping to make ones professional life a little more effective. CPAE is in the process of developing a registry of members in terms of their research and teaching interests. Such a registry will be most useful from a brokering aspect in terms of members communicating with each other over mutual concerns. It also will be interfaced with a similar registry recently developed by adult educators in the United Kingdom and has a future sharing capability with adult educators from other countries. I was able to put the beginning information on a file as an overall registry and then I was able to sort it in a variety of ways to find and communicate a whole host of commonalities. The power of the personal computer to do such activities with relatively little effort and so quickly is why the computer revolution is a real phenomenon and one every adult education professional should understand.

Implications for Adult Educators

The last section of this presentation will deal with several implications for the field of adult education, including a discussion of some philosophical issues, ideas pertaining to continuing education needs, and suggestions

about using personal computers as an administrative tool in educational administration.

A presentation of several notions about the important present and future implications needs to be preceded by some discussion of a few philosophical issues. Many adult educators, for example, are attracted into the profession because of their humanistic orientation or they become over time more oriented toward process in facilitating learning than in the actual products resulting from learning activities. Such individuals are likely to consider technology as counter to certain human values and to the very process of human development, itself. In other words, interpersonal interaction is believed to be an important and integral part of the process of adult education. Under such a belief system, the teacher serves in a facilitator mode and the learner is asked to accept considerable responsibility for the learning act, including functions such as assessing needs, planning specific learning activities, and evaluating personal performance.

Another frame of reference exists among those educators of adults who are often associated with training in business and industry or in other settings. In these instances, behavicralistic beliefs frequently prevail and adherence to externally derived goals or objectives is often necessary. Such a product orientation puts a teacher in the role of facilitating the learning structure itself, where learners often learn by being told or shown.

Each of the two frames of reference, and all of those which may fall somewhere in between, may be very appropriate given the particular situation or setting. However, the complexities of designing software and developing program based on other than behavioralist theories are immense. We simply do not know as much as we should about learning and teaching styles. The real challenge is finding ways of enhancing interaction and self directed involvement for those educational settings where such modes are desired or expected. Wesley Meierhenry provides an excellent discussion of this whole area in a chapter in a new book edited by David Gueulette, Microcomputers for Adult Learning.

There are a variety of continuing education implications. A huge need, and one tied to the point made above regarding the enhancement of interaction, is for adult educators to develop educational software. A good deal of software already exists, of course, that can be used with or that is designed for adult learning. However, it appears that the majority of such software has been created out of a behavioralist philosophy, not a humanist philosphy. Thus, adult educators must become creative and innovative in developing software that promote interaction between learners or between a learner

and some facilitating agent or resource. A group of individuals at Syracuse University, for example, are working to create such interactive-type programs for senior citizens but it has not been an easy task.

A wide variety of short courses and workshops (both credit and non-credit) are needed relative to personal computers. Such programming aimed at helping people learn to use computers, how to program in various languages, how to select software and hardware, etc. will be very much in vogue over the next few years. A special need will be to focus such programming toward those older adults who may find themselves somewhat frightened by computers but having to live in a society or with a job that requires computer literacy. Specific topics that will require future continuing education help include:

Calculating, financial management
Using graphics
Data processing
Word processing
Hardware maintenance
Hardware and software selection
Programming

The future also will see an increased use of personal computers for such activities or needs as paying bills and personal checking, burgler control, information seeking (such as through systems like the Source), investing and working with the stock market, interfacing with other people for communication and conferencing purposes, and printing or copying materials. It is not yet clear what all the continuing education needs will be, but the alert programmer should keep all those antenna up as such changes take place.

Personal computers also can be used in a variety of ways for improving administrative practices. They can be used for maintaining current course descriptions, electronic "tickler files" of deadlines and important dates, mailing lists coded for special constituencies, student schedules, and lists of possible new courses and faculty.

Visicalc and other "spreadsheet" programs provide a particularly useful tool for projecting budgets and keeping track of standard expenses. Most educational institutions use a standard budget form with built-in formulas for fringe benefits, administrative overhead, facility costs, etc. These formulas can be built into a Visicalc model and used for determining the costs of new programs or projecting next year's budget. A major feature of spreadsheet programs is the ability to gain rapid answers to such questions as what will be the total cost of a raise in salaries? What would happen to net income if we raise fees $45.00 and we have a drop of 50

students? Spreadsheet programs can eliminate mathematical errors and secretarial time spent retyping budgets after changes are made. A second use for spreadsheet programs is scheduling. After a planning matrix is prepared, changes in schedules are easily implemented on the spreadsheet. Monitoring changes are as easy as using a magnetic board and a 5" floppy disk is easier to file. Administrative applications for spreadsheets are limited only by your imagination.

One particular application of word processing as pointed up earlier is to set up templates for repetitive grant and report formats. Grant proposals often require the same sequencing of topic headings as well as standard information about the institution. Institutional history, characteristics, and affirmative action compliance statements can be set up in separate files and easily integrated into new applications for funding. Resumes of key staff can be kept in separate files. The resumes can easily be customized for specific grants by eliminating irrelevant material or by highlighting significant experiences. After the grant is written changes required by internal reviews can be easily implemented without extensive typing. Incidently, if you intend to use a small computer for extensive word processing applications investment in a good quality daisy wheel printer should be considered.

One final application that might be considered is communication with off campus programs through telephone lines. A modem can convert a personal computer into a terminal able to communicate with any other computer, large or small, equipped with a modem attached to a telephone line. While accoustical modems can be attached to a serial port of a small computer, modems equipped with a modular connection are more reliable. Direct connect modems vary in price from $90 to $700. Memos, class materials, programs and other materials can be transmitted to another computer at a rapid rate allowing "same day mail". The receiving computer can store the material on disk for later reading by your staff. With a proper program and hardware (primarily an internal real time clock) this can be accomplished automatically without human attendance at either end. Current capabilities include automatic dialing, answering, transmission, and storage of the information. The major draw back is that the phone line cannot be used for any other use as the answering computer transmits an awful stream of noise when it answers the phone.

A small computer in the office or home won't cure all problems but it can make many jobs more efficient and easier. We now look forward to some interaction with you regarding our thoughts and we will demonstrate some of the uses that we have described.